

Exhibit 3

ADVANCED ORGANIC CHEMISTRY

REACTIONS,
MECHANISMS, AND
STRUCTURE

FOURTH EDITION

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Amino Acids and Esters (continued)
resulting oxime or nitroso compound

2-11 From acyl halides and a dialkyl azodicarboxylate

6-5 Hydrolysis of cyanohydrins

6-16 Reaction between aldehydes, ammonia, and carboxylic acids or esters

6-50 Addition of cyanide and ammonium ions to aldehydes or ketones, followed by hydrolysis (Strecker)

8-14 Reaction between imides and NaOBr (Hofmann)

Amino Carbonyl Compounds0-46 Amination of α -hydroxy ketones

0-47 Transamination of Mannich bases

1-36 Photolysis of acylated arylamines

6-16 Reaction between aldehydes, ammonia, and aldehydes, ketones, or esters (Mannich)

8-13 Rearrangement of ketoxime tosylates (Neber)

8-22 Rearrangement of quaternary ammonium salts (Stevens)

9-23 Oxidation of certain enamines

Amino Ethers

0-18 Alcoholysis of aziridines

5-39 Aminomercuration of alkenes, followed by alcoholysis

6-16 Reaction between aldehydes, amines, and alcohols or phenols (Mannich)

Amino Thiols

0-49 Amination of episulfides

1-9 Sulfurization of aromatic amines (Herz)

6-16 Reaction between an aldehyde, ammonia, and a thiol (Mannich)

Anhydrides

0-27 Reaction of acyl halides with acid salts

0-28 Dehydration of carboxylic acids

0-33 Reaction of acid derivatives with inorganic acids

3-15 From aryl halides and CO

4-11 Acyloxylation of aldehydes

4-31 Reaction between diazonium fluoroborates, CO, and an acid salt

5-5 Addition of carboxylic acids to ketenes

5-22 Free-radical addition of anhydrides to olefins

8-20 Reaction between α -diketones and peroxy compounds (Baeyer-Villiger)

9-10 Oxidation of aromatic rings

Arenes

0-76 Reduction of aryl and benzylic halides

0-78 Hydrogenolysis of benzyl alcohols

0-79 Reduction of benzylic ethers

0-86 Coupling of halides containing aryl groups

0-87 Coupling of aryl halides with organometallic reagents

0-90 Coupling of benzylic alcohols

1-12 Alkylation of aromatic rings (Friedel-Crafts)

1-13 Arylation of aromatic rings (Scholl)

1-22 Diarylation of ketones

1-23 Ring closure of aryl-substituted carbonyl compounds

1-37 Cleavage or rearrangement of alkyl arenes

1-38 Decarbonylation of aromatic aldehydes or deacylation of aromatic ketones

1-39 Decarboxylation of aromatic acids

1-41 Desulfonation of aromatic sulfonic acids

1-42 Dehalogenation of aryl halides

1-44 Hydrolysis of organometallic compounds

2-40 Decarboxylation of α -aryl acids

2-41 Cleavage of tertiary alkoxides

2-45 Cleavage of aryl ketones

2-46 Cleavage of aryl ketones with amide ions (Haller-Bauer)

2-48 Decyanation of aryl nitriles

3-9 Reduction of phenols, phenolic ethers, or phenolic esters

3-10 Reduction of aromatic nitro compounds

3-13 Coupling of organometallic compounds with aryl halides, ethers, and esters

Arenes (i

3-16 Ce

3-17 Al

co

4-18 Fr

sal

Pa

4-21 Fr

4-22 Ph

4-24 R

4-29 Di

4-30 M

4-33 C

4-34 C

4-35 C

co

4-36 R

4-38 C

wi

4-41 D

hy

5-20 A

dr

5-51 Ti

6-29 A

dk

7-36 D

ta

8-30 Pl

pl

9-1 A

ri

9-6 O

9-33 D

9-37 R

9-43 R

Aryl Ha

1-11 H

p

1-35 R

(I

1-39 R

h

1-41 R

h

1-42 M

2-30 F

3-8 A

ti

- 2-543.
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.1-420,
58, 768-
965
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- 98-100
.1171,
35, 1198-
- 523
- , 417-
- 14
712
s, 411
s and
1-425
418-419
unds,
- oxide,
- acids,
- sters,
- , 417
romide,
- ounds,
- 16
s, 1080-
- nds, 835
- 2
ides, 499
560,
7, 1102
- reductive alkylation of, 898-900
in the Strecker synthesis, 965
sulfonation of, 528
thioalkylation of, 551
transamination of, 415
in the Ugi reaction, 980
in the Willgerodt reaction, 1237
Aminium radical ions, 527, 684, 692, 817
Amino acids:
conversion:
to amido ketones, 630-631
to halo acids, 436
to lactams, 419
decarboxylation, 629
formation of, 1277
protection of, 418, 421
Amino alcohols, *see* Hydroxyamines
Aminoalkylation, 545, 550-551
Amino-de-acyloxy-substitution, 418
Amino-de-alkoxylation, 421
(3)OC-*seco*-Amino-de-alkoxylation, 416
S-Amino-de-chlorination, 499
Amino-de-halogenation, 411, 413, 417, 656
Amino-de-hydrogenation, 416, 527, 668, 712
Amino-de-hydroxylation, 414, 419, 657
Amino-de-metallation, 616
2-Amino-1,1-diphenylbutan-1-ol, 914
Amino ethers, 391, 461
Amino ketones:
formation of, 1278
Aminomalononitriles, 966
Aminomercuration, 770, 832
Aminonitrenes, 834
Amino nitriles, *see* Cyanoamines
Aminophenols, *see* Hydroxyamines
Aminopyridines, 466
Aminosulfenylation, 834
Amino thioethers, 834
Amino thiols, formation of, 1278
5-Amino-2,4,6-triiodo-N,N,N',N'-tetramethylisophthalamide, 162
Aminonia:
addition to multiple bonds, 768-770, 896, 898-903
in Birch reduction, 781
bond angles, 6, 22
inversion of, 98-99
in the Mannich reaction, 900-902
as a nucleophile, 411-412, 415-421, 656-658, 768-770, 896, 898-903, 965
reaction:
with acyl halides, 417-418
with aldehydes, 712, 896, 907
with alkyl halides, 411
with alkyl sulfates and sulfonates, 412
with anhydrides, 418-419
with carboxylic acids, 419
with carboxylic esters, 421, 423-424
with diazo compounds, 415, 1083
with epoxides, 416
with multiple bonds, 835
to give NH, 203
with ozonides, 1177
with sulfonyl halides, 499
reductive alkylation of, 898-900
in the Strecker synthesis, 965
in the Ugi reaction, 980
in the Willgerodt reaction, 1237
Ammonium chloride, 659, 907, 965
Ammonium dihydrogen phosphate, 907
Ammonium formate, 1210, 1217
Ammonium nitrate, 1169
Ammonium peroxydisulfate, 720, 1188-1189
Ammonium polysulfide, 1237
Ammonium sulfide, 1216
AM1 method, 28
 A_NA_B mechanism, 737
 $A_N + A_B$ mechanism, 741
 $A_N + A_H$ mechanisms, 741
Anchimeric assistance, 309, 314-318, 320-325, 1055-1056, 1060, 1119
in free radical reactions, 682
 $A_N + \text{cyclo-}D_2A_2D_2$ mechanism, 573
 $A_2D_2D_N$ mechanism, 983
 $A_2D_2 + D_N$ mechanism, 991
 A_ND_N mechanism, 294
3/1/ A_ND_N mechanism, 329
 $A_N + D_N$ mechanism, 331, 642
- Angular methyl group,
oxidation of, 1154
Anhydrides:
addition to multiple bonds, 807
bisdecarboxylation of, 1187
condensation with aldehydes, 954
conversion:
to acyl azides, 429
to acyl fluorides, 438
to amides, 418-419
to carboxylic esters, 392-393
to imides, 419, 427
to mixed anhydrides, 405
to peroxides, 403
to thiol acids and esters, 409
disproportionation of, 401
formation of, 1278
halogenation of, 590
in hydroacylation, 806
hydrolysis of, 377
reaction:
with active hydrogen compounds, 490, 491
with aldehydes and ketones, 491, 890, 971
with alkenes, 599
with amino acids, 630-631
with aromatic rings, 540-541
with enamines, 602
with organometallic compounds, 488-489, 932
with phosphoranes, 962-963
with SF_4 , 909
with sulfoxides, 1236
reduction of, 448, 1213-1215
Aniline, 270
Anionic cleavage, 592, 593, 626-633, 761
1,3-Anionic cycloadditions, 854
Anionotropic rearrangements, 1051
Anisole, 525
Annellation, 44, 46, 60
Annual Reviews, 1253-1254
Annulenes, 51-66
[18] Annulene, 714
Anodic oxidations, 703, 712
Anomeric effect, 147
Antarafacial reactions, 851, 857-858, 875, 960, 1031, 1122-1125, 1127
Anthracenes, 37, 43, 1192
Anthraquinone, 1192